

CONTRIBUTIONS
FROM THE
CUSHMAN LABORATORY
FOR
FORAMINIFERAL RESEARCH

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SHARON, MASSACHUSETTS, U. S. A.
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These contributions will be issued quarterly. They will contain short papers with plates, describing new forms and other interesting notes on the general research work on the foraminifera being done on the group by the workers in this laboratory. New literature as it comes to hand will be briefly reviewed.

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CONTRIBUTIONS FROM THE CUSHMAN LABORATORY FOR FORAMINIFERAL RESEARCH

137. SOME NEW RECENT FORAMINIFERA FROM THE TROPICAL PACIFIC*

By JOSEPH A. CUSHMAN

Owing to the fact that present conditions make necessary the delay of the publication of Part 3 of Bulletin 161, U. S. National Museum, on the Foraminifera of the Tropical Pacific Collections, it has seemed wise to publish here figures and descriptions of some of the new forms that will be included in that part when published. Numerous inquiries have been made concerning certain of the species of this portion of the work, and this publication will make available at least some of the new forms included in those collections.

BOLIVINITA SUBANGULARIS (H. B. Brady), var. *LINEATA* Cushman, n. var.
(Pl. 8, figs. 1, 2)

Variety differing from the typical in the wall which is ornamented with supplementary small costae in addition to the typical large ones.

Holotype of variety (Cushman Coll. No. 19282) from Levuka, Fiji, in 12 fathoms.

This variety also occurs in 3 fathoms, off Viva Anchorage, Fiji.

MIMOSINA PACIFICA Cushman, n. sp. (Pl. 8, figs. 3 a, b)

Test irregularly triserial except in the adult portion which becomes biserial, tapering from an acute initial end to the broad, rounded, apertural end, nearly circular in end view; chambers distinct, inflated; sutures of the early portion indistinct, later ones slightly depressed; wall calcareous, finely perforate, the initial portion with short spines which in the later portion become largely confined to the base of the chamber; aperture double

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in the adult, a narrow slit at the base of the inner margin of the last-formed chamber, above which is a low, elongate, supplementary opening. Length of holotype 0.35 mm.; diameter 0.25 mm.

Holotype (Cushman Coll. No. 17285) from off Levuka, Fiji, 12 fathoms.

This distinctive small species also occurs at Mokaujar Anchorage, Fiji, and Rongelab Atoll, Marshall Islands.

TRIMOSINA ORIENTALIS Cushman, n. sp. (Pl. 8, figs. 4 a-c)

Test elongate, tapering, two or three times as long as broad, the basal ends of the chambers much angled, especially in the young stages; chambers very distinct, inflated, the early ones very angular, those of the adult becoming less so; sutures distinct, depressed; wall coarsely perforate; aperture an elongate, curved, slit-like opening becoming broader in the last-formed chamber. Length up to 0.55 mm.; diameter 0.25 mm.

Holotype (Cushman Coll. No. 17294) from 7 fathoms off Rotonga.

This is apparently a species of shallow warm water, and has a wide distribution as the following records of our material show: in the vicinity of the Fiji Islands, 12 and 24 fathoms off Nairai; 12 fathoms off Levuka; 3 fathoms, Viva Anchorage; and 40-50 fathoms off Fiji; as well as at Mokaujar Anchorage. Specimens also were found common at Vavau Anchorage, Tonga Islands, in 18 fathoms, and rare specimens occurred in the material from Rongelab Atoll, Marshall Islands.

BULIMINELLA MILLETTI Cushman, n. sp. (Pl. 8, figs. 5, 6)

Test small, tapering, initial end bluntly rounded, increasing in diameter toward the apertural end, consisting of two or three whorls; chambers distinct, in the last-formed whorl numerous, four or more making up the whorl, slightly inflated; sutures distinct, flush with the surface or very slightly depressed, slightly limbate; wall smooth, very finely perforate; aperture a semi-elliptical opening, at the base of the apertural face which is broad and depressed. Length 0.30 mm.; breadth 0.15-0.20 mm.

Holotype (Cushman Coll. No. 17310) from Mokaujar Anchorage, Fiji.

This species also occurs in the shallow water samples from 12 fathoms, Levuka, Fiji; 12 and 24 fathoms, Nairai, Fiji; 18 fathoms, Vavau Anchorage, Tonga Islands; off Niau and Niau Lagoon; Rongelab Atoll, Marshall Islands; 7 fathoms, Rotonga;

Port Lotten, Kersail, Caroline Islands; and 21 fathoms, Guam Anchorage, Ladrone Islands. It did not occur at any of the deeper *Albatross* stations.

The species is very distinct from either *Buliminella elegantissima* or *B. apiculata*, and seems to be a distinct Indo-Pacific species in shallow water. It seems probable that this is the form which Millett referred to *Bulimina elegantissima* d'Orbigny (Journ. Roy. Micr. Soc., 1900, p. 276, pl. 2, fig. 4). He refers to it as very abundant in the Malay Archipelago. Our species is named for the late F. W. Millett.

BULIMINA FIJIENSIS Cushman, n. sp. (Pl. 8, figs. 7 a-c)

Test small, stout, slightly longer than broad, rounded; chambers distinct, inflated, comparatively few, increasing rapidly in size as added; sutures distinct, depressed; wall coarsely perforate, except about the aperture which is smooth and apparently without perforations; aperture elongate, somewhat comma-shaped, at the base of the apertural chamber and extending somewhat into the apertural face. Length 0.25 mm.; breadth 0.15 mm.

Holotype (Cushman Coll. No. 17332) from 12 fathoms, Nairai, Fiji.

This small species seems to be very distinct, but limited in its distribution as it has occurred only at the type station and at Levuka, Fiji, also in 12 fathoms.

BOLIVINA PSEUDOPYGMAEA Cushman, n. sp. (Pl. 8, figs. 8 a, b)

Test one-half to two times as long as broad, the early portion tapering and the later portion in the adult often with nearly parallel sides, initial end subacute, apertural end broadly rounded, periphery acute but not keeled, the early chambers often with short backward pointing spines; chambers distinct, about as high as broad but much overlapping so that the visible portion of the chamber in the early stages is apparently two or three times as broad as high; sutures distinct, but only slightly depressed, only slightly oblique; wall nearly transparent except toward the base of the chamber where it becomes opaque due to the large close-set perforations; aperture elongate, comma-shaped. Length 0.35 mm.

Holotype (U. S. N. M. No. 26171) from *Albatross* station H3989, South Pass Likieb, N. $1\frac{1}{2}$ m., in 468 fathoms, at 42.6° F., coarse coral sand.

This is a very distinctive species, occurring in small numbers but at numerous *Albatross* stations. Its distribution is comparatively limited as the position of these stations shows them all to be in the general region of the Marshall Islands. It is interesting to note that the only shallow water station at which the species occurred is that of Rongelab Atoll, Marshall Islands.

BOLIVINA CAPITATA Cushman, n. sp. (Pl. 8, figs. 12 a, b)

Test elongate, tapering gradually from the subacute initial end to the somewhat swollen apertural end, periphery rounded and somewhat lobulated; chambers numerous, distinctly inflated especially toward the apertural end; sutures distinct, depressed, strongly oblique; wall smooth, nearly transparent, finely perforate; aperture broadly elliptical, sometimes tending to become terminal. Length up to 0.50 mm.

Holotype (Cushman Coll. No. 17556) from Levuka, Fiji, 12 fathoms.

This is a very distinctive species with the very inflated chambers especially toward the apertural end, with the general shape and lobulated periphery and numerous chambers. It has occurred rather commonly at the shallow water stations: 12 and 24 fathoms, off Nairai, Fiji; and 12 fathoms, off Levuka, Fiji. Specimens were also obtained from 7 fathoms, off Rotonga.

BOLIVINA GLOBULOSA Cushman, n. sp. (Pl. 8, figs. 9 a, b)

Test small, elongate, tapering gradually from the subacute initial end to the greatest breadth formed by the last two chambers, periphery rounded; chambers inflated, more or less globose, increasing rather uniformly in size as added; sutures distinct, depressed, somewhat sigmoid, slanting backward but a small amount from the horizontal; wall smooth, finely perforate; aperture comparatively large, at the base of the last-formed chamber, and forming a loop-shaped opening. Length of holotype 0.70 mm.; breadth 0.40 mm.; thickness 0.15 mm.

Holotype (U. S. N. M. No. 26172) from *Albatross* station H3786, Lat. 12° 07' 00" N., Long. 137° 18' 00" W., in 2,883 fathoms.

This is a small species but is rather widely distributed in the *Albatross* collections.

BOLIVINA OCEANICA Cushman, n. sp. (Pl. 8, figs. 10 a, b)

Test small, tapering only at the ends, greatest breadth rather rapidly attained after which the sides are nearly parallel for most of their length, periphery slightly rounded, test in end view elliptical; chambers fairly distinct, not greatly inflated, of rather uniform size and shape in the adult, increasing only slightly in size as added; sutures distinct, very slightly depressed, forming a very slight angle with the horizontal in the early stages, and increasing slightly but gradually as chambers are added; wall smooth, distinctly perforate; aperture small, at the base of the inner margin of the last-formed chamber, forming a distinct re-entrant in the apertural face but not strongly contracted at the base. Length 0.60 mm.; breadth 0.25 mm.; thickness 0.12 mm.

Holotype (U. S. N. M. No. 26173) from *Albatross* station H3838, Lat. 16° 57' 00" S., Long. 148° 58' 00" W., in 2,224 fathoms.

This small species has occurred only in the *Albatross* material from the deeper water stations.

BOLIVINA VADESCENS Cushman, n. sp. (Pl. 8, figs. 11 a, b)

Test elongate, in the adult about $2\frac{1}{2}$ times as long as broad, periphery distinctly rounded, the early stages rapidly increasing in width as chambers are added, after which the sides become nearly parallel; chambers very distinct but not strongly inflated, of rather uniform shape throughout but increasing very slightly in size as added; sutures very distinct, limbate, peculiarly sigmoid, the inner end especially in the adult having almost a distinct angle, after which the sutures pass to the border in a nearly straight line which is strongly oblique to the horizontal; wall smooth but very distinctly perforate; aperture at the base of the last-formed chamber, consisting of a broad loop-shaped opening. Length 0.65 mm.; breadth 0.30 mm.; thickness 0.15 mm.

Holotype (Cushman Coll. No. 19014) from 12 fathoms, off Nairai, Fiji.

This species in its general size and shape is very similar to *Bolivina oceanica*, but the chambers are very different in their shape, and the sutures particularly with their sigmoid curvature and strongly limbate character are very distinct. The species is fairly common in the shoal water of various Pacific areas.

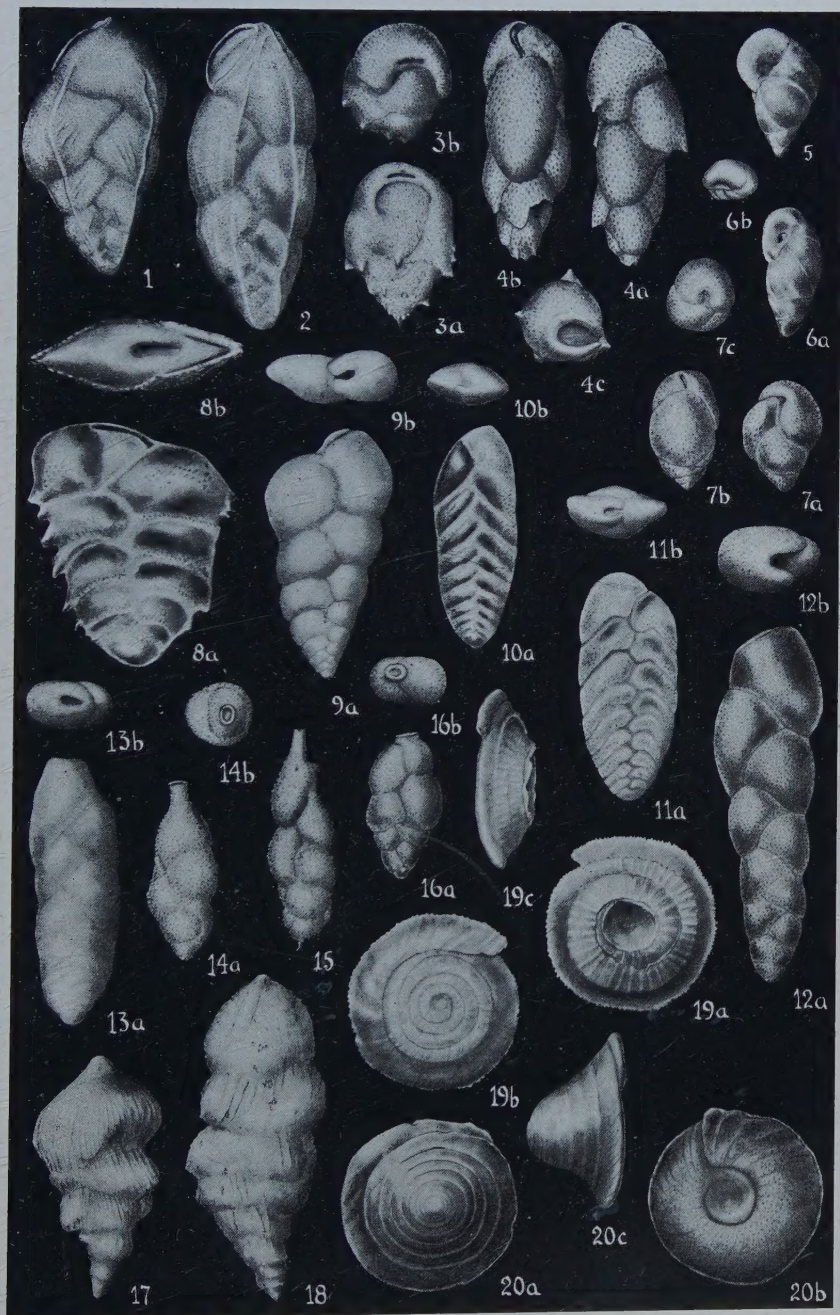
LOXOSTOMA ROSTRUM Cushman, n. sp. (Pl. 8, figs. 13 a, b)

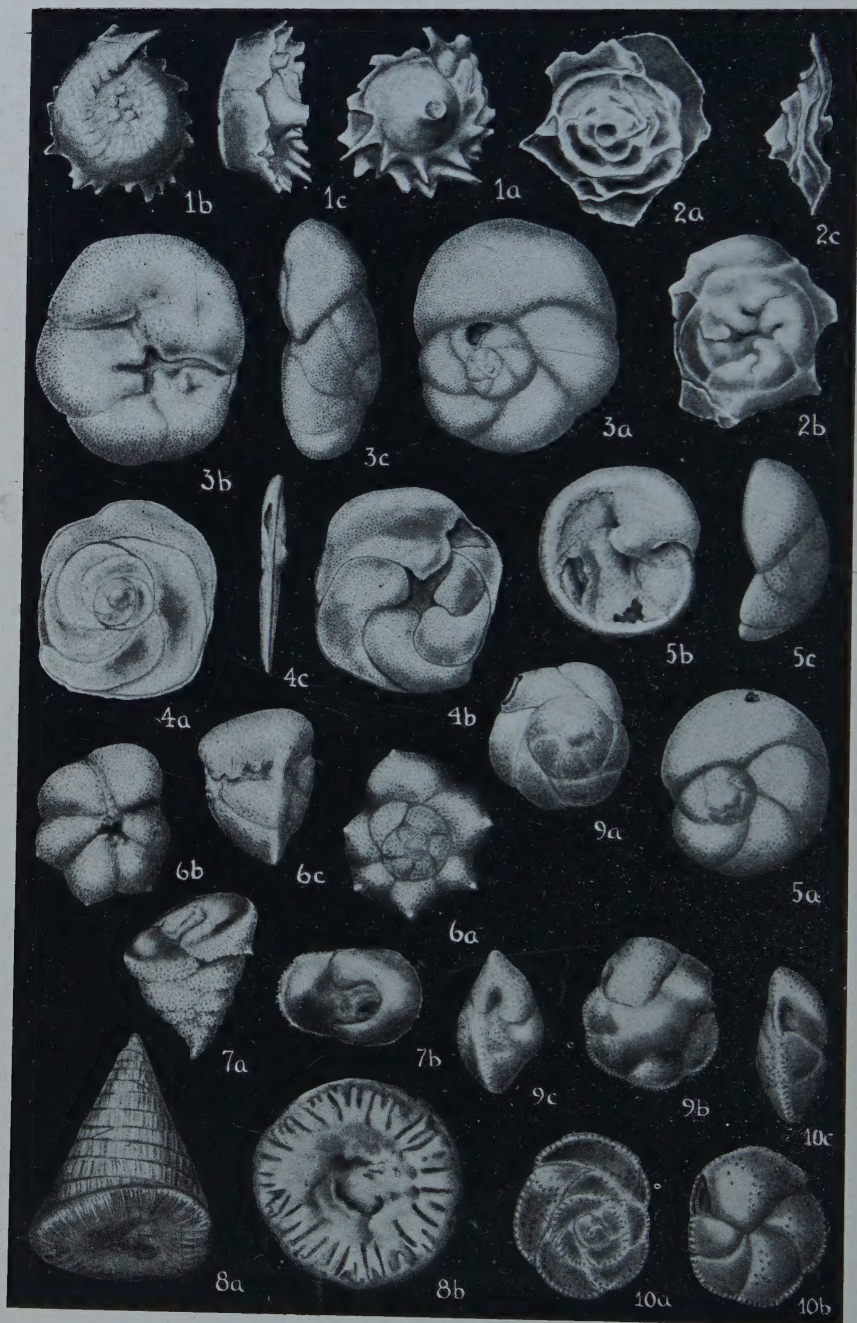
Test small, elongate, about three times as long as broad, the early portion rapidly expanding, but the remainder of the test with the sides nearly parallel, the last-formed chamber somewhat produced, periphery broadly rounded; chambers fairly distinct, only slightly inflated in the later portion, increasing rather rapidly in height toward the apertural end; sutures fairly distinct, very slightly depressed toward the apertural end, becoming gradually more oblique as chambers are added; wall smooth, very

EXPLANATION OF PLATE 8

- FIGS. 1, 2. *Bolivinita subangularis* (H. B. Brady), var. *lineata* Cushman, n. var. $\times 40$. Fig. 1, Paratype. Fig. 2, Holotype.
- FIGS. 3 a, b. *Mimosina pacifica* Cushman, n. sp. $\times 60$. a, front view; b, apertural view.
- FIGS. 4 a-c. *Trimosina orientalis* Cushman, n. sp. $\times 60$. a, front view; b, side view; c, apertural view.
- FIGS. 5, 6. *Buliminella milletti* Cushman, n. sp. $\times 60$. Fig. 5, Holotype. Microspheric form. Figs. 6 a, b, Paratype. Megalospheric form. a, front view; b, apertural view.
- FIGS. 7 a-c. *Bulimina fijiensis* Cushman, n. sp. $\times 60$. a, front view; b, side view; c, apertural view.
- FIGS. 8 a, b. *Bolivina pseudopygmaea* Cushman, n. sp. $\times 55$. a, front view; b, apertural view.
- FIGS. 9 a, b. *Bolivina globulosa* Cushman, n. sp. $\times 55$. a, front view; b, apertural view.
- FIGS. 10 a, b. *Bolivina oceanica* Cushman, n. sp. $\times 55$. a, front view; b, apertural view.
- FIGS. 11 a, b. *Bolivina vadesceus* Cushman, n. sp. $\times 55$. a, front view; b, apertural view.
- FIGS. 12 a, b. *Bolivina capitata* Cushman, n. sp. $\times 55$. a, front view; b, apertural view.
- FIGS. 13 a, b. *Loxostoma rostrum* Cushman, n. sp. $\times 55$. a, front view; b, apertural view.
- FIGS. 14, 15. *Uvigerina proboscidea* Schwager, var. *vadesceus* Cushman, n. var. $\times 60$. Figs. 14 a, b, Holotype. a, front view; b, apertural view. Fig. 15, Paratype.
- FIGS. 16 a, b. *Hopkinsina pacifica* Cushman, n. sp. $\times 100$. a, front view; b, apertural view.
- FIGS. 17, 18. *Nodogenerina* (?) *milletti* Cushman, n. sp. $\times 60$. Fig. 17, Paratype. Fig. 18, Holotype.
- FIGS. 19 a-c. *Conicospirillina semi-involuta* Cushman, n. sp. $\times 35$. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 20 a-c. *Conicospirillina trochoidea* Cushman, n. sp. $\times 85$. a, dorsal view; b, ventral view; c, peripheral view.

Figures drawn by Margaret S. Moore.





finely perforate; aperture in the adult terminal, ovate, without a distinct lip. Length 0.75 mm.; breadth 0.25 mm.; thickness 0.15 mm.

Holotype (U. S. N. M. No. 26170) from *Albatross* station H3840, Lat. 17° 21' 00" S., Long. 149° 15' 00" W., in 1,585 fathoms.

This is a species of comparatively deep water, occurring at several Pacific *Albatross* stations.

UVIGERINA PROBOSCIDEA Schwager, var. VADESCENS Cushman, n. var.
(Pl. 8, figs. 14, 15)

Variety differing from the typical in the more slender form, smaller size, and the base which is usually ornamented with a very distinct acicular spine, the apertural end tapering with a very distinct, sometimes rather elongate, cylindrical neck and slight lip.

Holotype of variety (Cushman Coll. No. 17515) from 21 fathoms, Guam Anchorage, Ladrone Islands.

Besides at the type locality, this variety occurs off Nairai, Fiji, and at 12 fathoms, off Levuka, Fiji. It also occurs at numerous *Albatross* stations in deeper water.

EXPLANATION OF PLATE 9

- FIGS. 1 a-c. *Conicospirillina coronata* Cushman, n. sp. × 85. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 2 a-c. *Discorbis frustata* Cushman, n. sp. × 80. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 3 a-c. *Discorbis opima* Cushman, n. sp. × 80. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 4 a-c. *Discorbis crustata* Cushman, n. sp. × 55. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 5 a-c. *Discorbis micens* Cushman, n. sp. × 80. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 6 a-c. *Eponides fijiana* Cushman, n. sp. × 85. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 7 a, b. *Patellinella fijiana* Cushman, n. sp. × 100. a, side view; b, ventral view.
- FIGS. 8 a, b. *Patellina advena* Cushman, var. *altiformis* Cushman, n. var. × 80. a, side view; b, ventral view.
- FIGS. 9 a-c. *Pulvinulinella umbonifera* Cushman, n. sp. × 60. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 10 a-c. *Pulvinulinella pulchra* Cushman, n. sp. × 80. a, dorsal view; b, ventral view; c, peripheral view.

Figures drawn by Margaret S. Moore.

HOPKINSINA PACIFICA Cushman, n. sp. (Pl. 8, figs. 16 a, b)

Test small, fusiform, early portion with the chambers irregularly triserial, later generally biserial, somewhat compressed; chambers distinct, inflated, in the adult with two pairs of biserial chambers; sutures distinct, depressed; wall smooth, finely perforate; aperture with a short neck and slightly thickened lip. Length 0.20 mm.; breadth 0.10 mm.; thickness 0.07 mm.

Holotype (Cushman Coll. No. 17513) from Vavau Anchorage, Tonga Islands.

This is a very small species, but evidently belongs in this genus.

NODOGENERINA (?) MILLETTI Cushman, n. sp. (Pl. 8, figs. 17, 18)

Sagrina nodosa MILLETT (not PARKER and JONES), Journ. Roy. Micr. Soc., 1903, p. 271, pl. 5, figs. 12-15.

Test elongate, tapering rapidly from the somewhat narrow base, greatest breadth in the adult specimens near the middle, and later chambers somewhat reduced in size; chambers numerous, those of the early portion not inflated, later ones much inflated and excavated at the base, forming a distinct ridge about that portion; sutures distinct, depressed especially in the later portion; wall calcareous, perforate, ornamented by very fine longitudinal costae which tend to break up into fine rows of papillae; aperture rounded, at the end of a slight neck, but without a definite lip. Length 0.70 mm.; breadth 0.20 mm.

Holotype (Cushman Coll. No. 19017) from 21 fathoms, Guam Anchorage, Ladrone Islands.

The only other records for this species are those given by Millett from the Malay region. This is not the same as Parker and Jones' species, and the generic position of it is very much in doubt. Millett figures some very strange forms with lobed chambers, and the early portions possibly not entirely uniserial. Our specimens have been too few to warrant the making of sections for determining the structure of this early part, and this generic position must remain doubtful until sufficient material can be obtained for sectioning.

CONICOSPIRILLINA SEMI-INVOLUTA Cushman, n. sp. (Pl. 8, figs. 19 a-c)

Test conical-spiral, dorsal side forming a low spire, ventral side somewhat concave, periphery acute, very finely serrate, early coils somewhat involute; wall ornamented on the dorsal side,

particularly in the early coils by radiating, slightly raised ridges, ventrally with very slight ridges, somewhat oblique. Diameter 0.70 mm.; height 0.20 mm.

Holotype (Cushman Coll. No. 19019) from 40-50 fathoms, off Fiji.

CONICOSPIRILLINA TROCHOIDEA Cushman, n. sp. (Pl. 8, figs. 20 a-c)

Test forming a high spire on the dorsal side, ventral side somewhat concave in the middle, periphery subacute, apex broadly rounded, adult coils somewhat flaring, dorsal side smooth, ventral side marked by oblique lines. Diameter 0.30 mm.; height 0.18 mm.

Holotype (Cushman Coll. No. 19284) from Guam Anchorage, Ladrone Islands, in 21 fathoms.

This high-spired form reminds one somewhat of the early stages of *Discorbis tuberculata* (Chapman).

CONICOSPIRILLINA CORONATA Cushman, n. sp. (Pl. 9, figs. 1 a-c)

Test with initial portion forming a high spire, ventrally slightly concave in the middle, periphery obliquely truncate, upper border extending out in elongate pointed spines, dorsal side smooth, ventral side with the umbilical region ornamented by several, large, rounded bosses, the outer portion of the coil with curved lines. Diameter 0.30 mm.; height 0.15 mm.

Holotype (Cushman Coll. No. 19020) from off Fiji, 40-50 fathoms.

This is a very distinctly ornamented species found only at the type station.

PATELLINA ADVENA Cushman, var. *ALTIFORMIS* Cushman, n. var. (Pl. 9, figs. 8 a, b)

Variety differing from the typical in the very high spire, in typical forms greater than the diameter.

Holotype of variety (Cushman Coll. No. 18995) from off Fiji, 40-50 fathoms.

At this locality the variety is very distinctive.

PATELLINELLA FIJIANA Cushman, n. sp. (Pl. 9, figs. 7 a, b)

Test minute, in a compressed cone, initial end sharply pointed; chambers two to a whorl in the adult, increasing rather uniformly in size as added; sutures distinct, slightly depressed; wall finely spinose, except the ventral side which is smooth; aperture

ventral, in a broad indentation of the ventral face. Diameter 0.20 mm.; height 0.25 mm.

Holotype (Cushman Coll. No. 17554) from off Nairai, Fiji.

This is a very distinctive small species, very distinct from the several other species of the genus which occur in the same general region.

DISCORBIS FRUSTATA Cushman, n. sp. (Pl. 9, figs. 2 a-c)

Test forming a low cone, dorsal side forming a distinct spire, ventral side somewhat umbilicate; chambers distinct, four or five in the adult coil, with a wide thin flange at the periphery, and somewhat curving upward, ventral side smooth, chambers fairly distinct, on the ventral side convex, and with a distinct re-entrant on each chamber in the adult. Diameter 0.35 mm.; height 0.15 mm.

Holotype (Cushman Coll. No. 19286) from off Fiji, 40-50 fathoms.

This very extravagantly ornamented species has occurred in some numbers at the type station, and seems to be a local species.

DISCORBIS OPIMA Cushman, n. sp. (Pl. 9, figs. 3 a-c)

Test with about five chambers in a whorl, ventral side somewhat concave, dorsal side forming a low cone, periphery broadly rounded; chambers in the last-formed coil rapidly increasing in size as added; sutures distinct, slightly depressed, strongly curved; wall smooth, distinctly perforate on the dorsal side, on the ventral side with the perforations largely restricted to the outer portion; aperture ventral, elongate, umbilical. Diameter 0.40 mm.; height 0.18 mm.

Holotype (Cushman Coll. No. 19287) from 24 fathoms, Nairai, Fiji.

This is a common species, occurring at many stations in the Tropical Pacific.

DISCORBIS CRUSTATA Cushman, n. sp. (Pl. 9, figs. 4 a-c)

Test very flat and scale-like, the earliest whorl very slightly raised above the general surface, remainder plate-like, composed of about five chambers in the adult whorl, increasing rapidly in size as added, periphery subacute; sutures distinct, very strongly curved, slightly limbate; wall smooth, distinctly perforate; aperture ventral, elongate. Diameter 0.60 mm.; height 0.08 mm.

Holotype (Cushman Coll. No. 19288) from 24 fathoms, off Nairai, Fiji.

This very thin, scale-like species is rather widely distributed in the Tropical Pacific collections.

DISCORBIS MICENS Cushman, n. sp. (Pl. 9, figs. 5 a-c)

Test small, plano-convex, dorsal side forming an even convex surface, ventral side flattened or slightly concave, periphery sub-acute or rounded, four chambers in the adult coil, enlarging rapidly as added; sutures distinct, strongly curved, very slightly depressed; wall smooth but coarsely perforate; aperture an elongate slit on the ventral side, with an overhanging projection of the chamber wall. Diameter 0.35 mm.; height 0.15 mm.

Holotype (U. S. N. M. No. 26159) from *Albatross* station H3851, Apataki, South end, North 9 miles, Paumotu Islands, in 675 fathoms.

This species has occurred at numerous *Albatross* stations in the Tropical Pacific, all in comparatively deep water.

EPONIDES FIJIANA Cushman, n. sp. (Pl. 9, figs. 6 a-c)

Test small, somewhat plano-convex, dorsal side flattened, ventral side very strongly convex, about six chambers in the adult whorl, each of rather uniform shape, enlarging somewhat as added, the middle of the periphery extended into a short spine; sutures distinct, slightly oblique on the dorsal side, nearly radial ventrally, slightly limbate; wall smooth, distinctly perforate; aperture ventral, between the periphery and the umbilicus, elongate, the apertural edge of the chamber somewhat scalloped. Diameter 0.30 mm.; height 0.20 mm.

Holotype (Cushman Coll. No. 19400) from 12 fathoms, Nairai, Fiji.

This is a very distinctive although small species with a limited distribution.

EPONIDES TEREBRA Cushman, n. sp. (Pl. 10, figs. 1 a-c)

Test plano-convex, dorsal side forming a low spire, ventral side flattened, somewhat concave in the umbilical region, periphery rounded, slightly keeled; chambers numerous, 8-10 making up the last-formed whorl in the adult, of uniform shape, increasing gradually in size as added; sutures distinct, strongly curved, ventrally slightly depressed, dorsally slightly raised and limbate; wall smooth except for the raised sutures, and on the ventral side

each chamber with one or more openings in the central portion, these openings increasing in number in the adult chambers; aperture an elongate opening on the ventral side with a slight indentation of the margin of the chamber. Diameter 0.85 mm.; height 0.35 mm.

Holotype (U. S. N. M. No. 26160) from Anu Anuraro Atoll, Southeast $\frac{1}{2}$ mile, Paumotu Islands, 405 fathoms.

This species with its peculiar ventral surface has been found only in comparatively deep water in the *Albatross* collections. The specimens, however, are widely distributed, and both young and old stages show the peculiar ventral openings which increase in number as the chambers enlarge, and therefore appear not to be accidental.

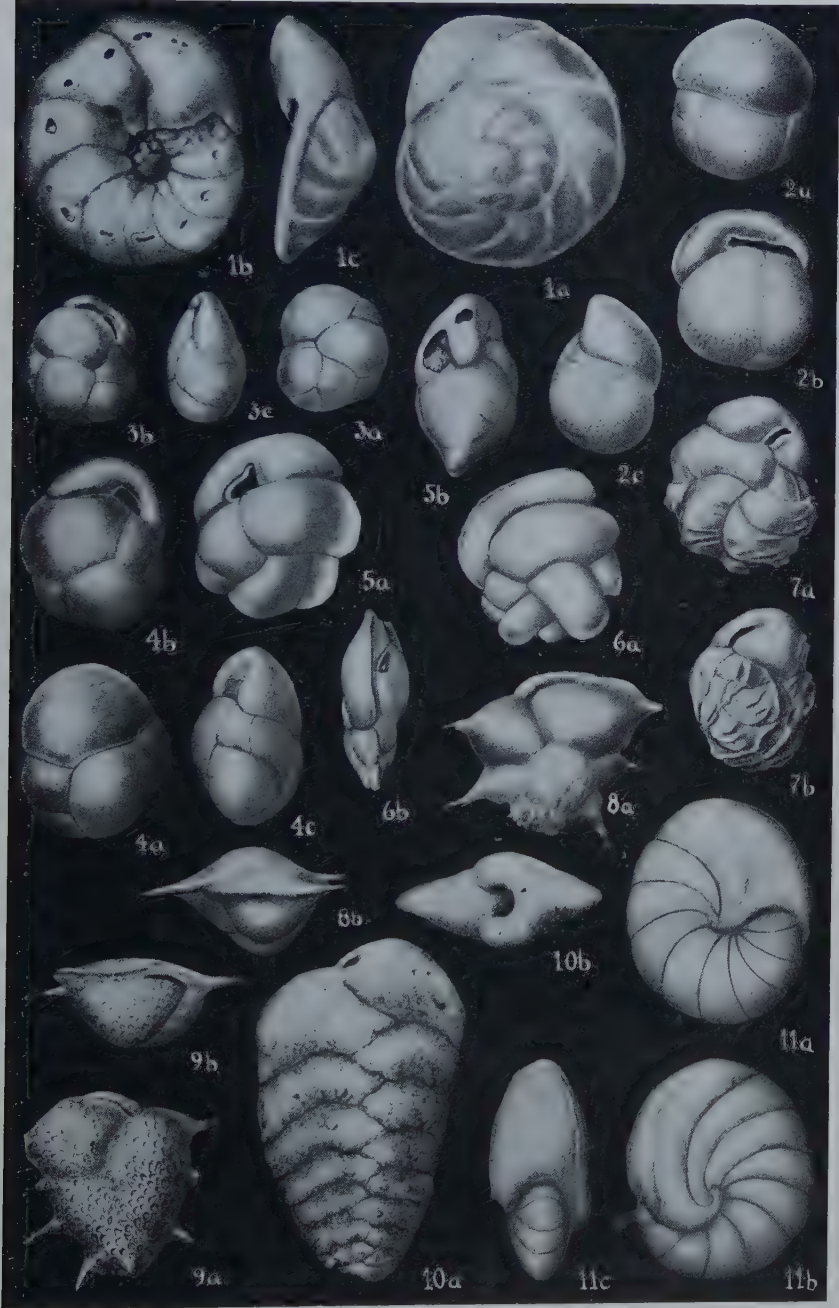
PULVINULINELLA UMBONIFERA Cushman, n. sp. (Pl. 9, figs. 9 a-c)

Test small, biconvex, ventral side more strongly convex than the dorsal and with a very distinct umbonate area; chambers distinct, about six in the adult whorl, of uniform shape, increasing slightly in size as added; sutures distinct, strongly oblique on the

EXPLANATION OF PLATE 10

- FIGS. 1 a-c. *Eponides terebra* Cushman, n. sp. $\times 40$. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 2 a-c. *Cassidulina patula* Cushman, n. sp. $\times 55$. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 3 a-c. *Cassidulina minuta* Cushman, n. sp. $\times 85$. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 4 a-c. *Cassidulina rarilocula* Cushman, n. sp. $\times 80$. a, dorsal view; b, ventral view; c, peripheral view.
- FIGS. 5 a, b. *Cassidulina subtumida* Cushman, n. sp. $\times 55$. a, ventral view; b, peripheral view.
- FIGS. 6 a, b. *Cassidulina angulosa* Cushman, n. sp. $\times 55$. a, ventral view; b, peripheral view.
- FIGS. 7 a, b. *Cassidulina costatula* Cushman, n. sp. $\times 55$. a, ventral view; b, peripheral view.
- FIGS. 8 a, b. *Ehrenbergina albatrossi* Cushman, n. sp. $\times 35$. a, front view; b, apertural view.
- FIGS. 9 a, b. *Ehrenbergina reticulata* Cushman, n. sp. $\times 35$. a, front view; b, apertural view.
- FIGS. 10 a, b. *Textularia smithvillensis* Cushman and Ellisor, n. sp. $\times 35$. a, front view; b, apertural view.
- FIGS. 11 a-c. *Nonionella cockfieldensis* Cushman and Ellisor, n. sp. $\times 80$. a, b, opposite sides; c, peripheral view.

Figures drawn by Margaret S. Moore.



dorsal side, slightly oblique on the ventral, dorsally somewhat limbate, ventrally somewhat depressed; wall smooth, except for a slightly crinkled edge on the ventral side; aperture somewhat elongate, rounded, in the axis of coiling. Diameter 0.35 mm.; height 0.20 mm.

Holotype (U. S. N. M. No. 26162) from *Albatross* station H3833, off Paumotu Islands, Lat. $15^{\circ} 42' S.$, Long. $148^{\circ} 44' W.$, in 2,243 fathoms.

This species is a very distinctive one, and occurred at numerous *Albatross* stations rather widely distributed, but only in comparatively deep water.

PULVINULINELLA PULCHRA Cushman, n. sp. (Pl. 9, figs. 10 a-c)

Test small, unequally biconvex, dorsal side flattened or slightly convex in the center, ventral side strongly convex; chambers distinct, five making up the last-formed whorl, increasing gradually in size as added; sutures distinct, dorsally strongly oblique, ventrally slightly curved, depressed; wall coarsely perforate, with a crinkled keel; aperture elongate, rounded, in the axis of coiling. Diameter 0.30 mm.; height 0.12 mm.

Holotype (Cushman Coll. No. 18999) from off Nairai, Fiji.

This species has a wide distribution in shallow water in the Tropical Pacific, and except for the lack of the tubular aperture is very close to *Siphonina*, showing the close connection between these two genera.

CASSIDULINA PATULA Cushman, n. sp. (Pl. 10, figs. 2 a-c)

Test rounded, the adult composed of comparatively few chambers, two or three pairs making up the entire outer surface, strongly involute; chambers inflated; sutures distinct, slightly depressed; wall smooth, distinctly perforate; aperture elongate, low, five or six times as long as high. Diameter 0.45 mm.; thickness 0.30 mm.

Holotype (U. S. N. M. No. 26155) from *Albatross* station H3916, from Paumotu Islands, Pinaki Atoll, East 1 mile, in 486 fathoms.

This species with its very few chambers, rounded form, and elongate aperture is distinctive and common in the deeper water of the Tropical Pacific.

CASSIDULINA MINUTA Cushman, n. sp. (Pl. 10, figs. 3 a-c)

Test minute, somewhat compressed, periphery broadly rounded, composed of about four pairs of chambers in the adult,

inflated, nearly as broad as long, periphery slightly lobulate; sutures distinct, very slightly depressed, slightly limbate; wall smooth; aperture elongate, four to five times as long as broad. Diameter 0.20 mm.; thickness 0.12 mm.

Holotype (U. S. N. M. No. 26156) from *Albatross* station H3825, off Paumotu Islands, Lat. $14^{\circ} 58' 35''$ S., Long. $148^{\circ} 35'$ W., in 844 fathoms.

This small species is rather widely distributed in the Tropical Pacific, but only in deep water.

CASSIDULINA RARILOCULA Cushman, n. sp. (Pl. 10, figs. 4 a-c)

Test small, somewhat compressed, periphery broadly rounded, adult composed of three pairs of chambers, broad, slightly inflated; sutures distinct, slightly limbate; wall smooth; aperture somewhat elongate, about three times as long as broad. Length 0.30 mm.; breadth 0.25 mm.; thickness 0.18 mm.

Holotype (U. S. N. M. No. 26157) from *Albatross* station H3937, off Hereheretue Atoll, Southeast 5.3 miles, in 1,688 fathoms.

This is a very common species in the deep water of the Tropical Pacific, composed of very few chambers, and in the earlier stages somewhat more limbate than in the adult.

CASSIDULINA SUBTUMIDA Cushman, n. sp. (Pl. 10, figs. 5 a, b)

Test somewhat compressed, particularly toward the periphery which is strongly lobulate; chambers about twice as long as broad, three pairs making up the adult whorl; sutures distinct, nearly straight, very slightly depressed; wall smooth; aperture somewhat triangular, with a distinct tooth-like projection. Diameter 0.50 mm.; thickness 0.30 mm.

Holotype (U. S. N. M. No. 26163) from *Albatross* station H3920, off Paumotu Islands, Lat. $19^{\circ} 52'$ S., Long. $140^{\circ} 16'$ W., in 2,284 fathoms.

This species is easily distinguished from any of the others here described by the aperture and the strongly convex central portion and thin margin. It is rather widely distributed in the deeper water of the Tropical Pacific.

CASSIDULINA ANGULOSA Cushman, n. sp. (Pl. 10, figs. 6 a, b)

Test much compressed, somewhat keeled, very strongly lobulate; chambers two to three times as long as broad, inflated; sutures distinct, depressed; wall smooth; aperture narrow, elongate. Diameter 0.50-0.60 mm.; thickness 0.20 mm.

Holotype (U. S. N. M. No. 26164) from *Albatross* station H3989, Marshall Islands, South Pass, Likieb, North $\frac{1}{2}$ mile, in 468 fathoms.

This species has a very different appearance from any of the others here described, with a very strongly lobulate periphery, compressed test, and elongate aperture. It is found only in comparatively deep water.

CASSIDULINA COSTATULA Cushman, n. sp. (Pl. 10, figs. 7 a, b)

Test broadly rounded, only slightly compressed, periphery somewhat lobulate, four pairs of chambers making up the adult whorl, slightly inflated; sutures distinct, strongly curved, slightly depressed; wall ornamented by short irregular costae somewhat independent of the individual chambers, later portion smooth; aperture elongate, narrow, nearly at right angles to the base of the chamber. Diameter 0.50 mm.; thickness 0.38 mm.

Holotype (U. S. N. M. No. 26165) from *Albatross* station H3935, Paumotu Islands, Hereheretue Atoll, West 1 mile, in 594 fathoms.

This is a distinctive species in its lobulate periphery and peculiar costate surface, most nearly resembling some of the forms described by Sidebottom from the Pacific.

EHRENBERGINA ALBATROSSI Cushman, n. sp. (Pl. 10, figs. 8 a, b)

Test broad, somewhat compressed, composed of few chambers, the outer margins of which are extended into long, stout, acicular spines; sutures distinct, slightly depressed; wall of the later portion smooth, earlier portion ornamented by somewhat raised, short costae or irregular spinose projections; aperture elongate, narrow. Length 0.80 mm.; breadth including spines 0.90 mm.; thickness 0.45 mm.

Holotype (U. S. N. M. No. 26166) from *Albatross* station H3873, Paumotu Islands, Southwest point of Tahanae, North 68°, East 4 miles, in 966 fathoms.

This is a distinctive species with its very long spines and peculiar ornamentation of the earlier chambers.

EHRENBERGINA RETICULATA Cushman, n. sp. (Pl. 10, figs. 9 a, b)

Test nearly as broad as long, periphery with large, stout, acicular spines; chambers and sutures largely obscured by the strongly reticulate surface pattern of the test; aperture narrow,

elongate. Length 0.80 mm.; breadth including spines 0.85 mm.; thickness 0.35 mm.

Holotype (U. S. N. M. No. 26168) from *Albatross* station H3974, Cook Islands, South point Jaluit Atoll, North 14°, East 5 miles, 1,937 fathoms.

This is a very distinctive species with its highly ornamented reticulate surface and acicular spines.

138. TWO NEW TEXAS FORAMINIFERA

By JOSEPH A. CUSHMAN and ALVA C. ELLISOR

The two species here described seem to be new and worthy of being placed on record.

TEXTULARIA SMITHVILLENSIS Cushman and Ellisor, n. sp. (Pl. 10, figs. 10 a, b)

Test large, broad at the apertural end, tapering nearly to a point at the initial end, compressed, thickest along the median line, periphery subacute; chambers numerous, consisting of 8-10 pairs in the adult, somewhat overlapping, very slightly inflated, of uniform shape, increasing very evenly in size as added; sutures slightly depressed, slightly oblique, often with an anterior bend about midway of the chamber; wall coarsely arenaceous, but fairly smoothly finished; aperture in a semi-circular reëntrant of the base of the apertural face. Length up to 1.50 mm.; breadth 0.80 mm.; thickness 0.40 mm.

Holotype (Cushman Coll. No. 19243) from Claiborne Eocene, Weches formation, South bank of Colorado River at Smithville, Bastrop Co., Texas.

This species seems to be characteristic of the Weches formation of Texas. It is probably the ancestor of the related species *T. hockleyensis* Cushman and Applin of the Jackson Eocene, and of *T. tumidulum* Cushman of the Lower Oligocene.

NONIONELLA COCKFIELDENIS Cushman and Ellisor, n. sp. (Pl. 10, figs. 11 a-c)

Test nearly bilaterally symmetrical, almost completely involute, later chambers on the ventral side extending below the umbilicus in a broad curve, periphery rounded; chambers very distinct, not inflated, about ten in the adult coil; sutures distinct,

not depressed, gently curved; wall smooth; aperture extending over onto the ventral side beneath the extension of the chamber. Length 0.40 mm.; breadth 0.35 mm.; thickness 0.18 mm.

Holotype (Cushman Coll. No. 19245) from the Claiborne Eocene, Cockfield formation, one-quarter mile below Robertson's Ferry on Sabine River, Sabine Co., Texas.

This small species seems to be characteristic of the Cockfield, and is related to some of the later species of the Jackson, but more involute.

139. ON HOMONYMS IN FORAMINIFERA

By HANS E. THALMANN

In the list below there are given some fifty examples of homonymous names amongst species of foraminifera erected during the last thirty years or so. The records are not intended to be wholly complete, and there may be still more homonyms found scattered in the literature of this period.

In Sherborn's well-known Index to Genera and Species of Foraminifera, a continuation of which for the years 1896-1930 is now being prepared by the writer, a great number of homonyms are cited, i.e., *Frondicularia* with over 30, *Cristellaria* and *Nodosaria* each over 60, *Quinqueloculina* with about 14, *Rotalia* with 11, *Spiroloculina* with 10, etc.

It is indisputable that an application of the same specific term for different species results in being very burdensome to the systematist, and that every effort should be made to avoid and eliminate in the future these nomenclatorial errors. Articles 34 and 36 of the International Rules of Zoological Nomenclature clearly prohibit homonymous naming, and courtesy (code of ethics) amongst scientists obliges that no renaming should be done by a later author unless the originator of the homonym has been duly notified to do it himself. This applies also to forms published as "n. sp.," "sp. indet.," "cf.," and "aff.," created under the rule of the *nomenclatura aperta*.

With regard to the forthcoming continuation of Sherborn's Index, the writer prepared the following list in order to attract

the attention of the authors to the homonyms which should be re-named within about two years' interval after publication of this list.

As this list is intended primarily for the authors of the homonyms, no exact citations of publication, pagination, and illustration are given. Homonyms of nomina nuda are not recorded because such names, from a nomenclatorial point of view, must be regarded as non-existent.

In the following list the original name of the species is given, followed by the homonym of subsequent authors.

- Ammobaculites compressus* (Beissel 1891, *Haplophragmium*) in Franke 1927—Cushman and Waters 1927
- Anmodiscus irregularis* Grzybowski 1897—Koch 1926
- tenuissimus* Grzybowski 1897—(Gümbel 1862) in Paalzow 1932
- Bulimina compressa* Bailey 1851—Carsey 1926
- trilobata* d'Orbigny 1826—Franke 1928
- Cristellaria bradyi* Goës 1894—Cushman 1921
- falcata* Karrer 1878—Franke 1928
- gracilis* Kübler and Zwingli 1866—Zalessky 1927
- gümbeli* Schwager 1865—Paalzow 1917
- kochi* Reuss 1865—Pijpers 1933
- multiseptata* Reuss 1850-51—*Cr. multiseptae* Berry 1928
- polygona* Perner 1890—Paalzow 1917
- recta* d'Orbigny 1840—Scheffen 1932
- Dentalina pectinata* Terquem 1870—Paalzow 1932
- Discorbis peruvianus* (d'Orbigny 1839, *Rosalina*)—Berry 1928
- inflatus* Perner 1892—Heron-Allen and Earland 1924
- Fronicularia costata* Kübler and Zwingli 1866—Koch 1926
- elongata* Costa 1855—Olszewski 1875—White 1928
- linearis* Philippi 1843—Franke 1928
- nuda* Terquem and Berthelin 1875—Chapman and Crespin 1928
- Globigerina aspera* (Ehrenberg 1854, *Phanerostomum*)—Koch 1926
- subcretacea* Lomnicki 1901—Chapman 1902
- Lagena lanceolata* Herrmann 1917—Paalzow 1932
- Lepidocyclina aspera* Checchia-Rispoli 1905—Berry 1929
- delicata* Berry 1929—*L. delicata* Scheffen 1932
- douvillei* Prever 1905—Yabe and Hanzawa 1922
- mortoni* Prever 1912—Cushman 1920
- Marginulina aequalis* Terquem 1863—Franke 1925
- gracilis* Cornuel 1848—Koch 1926
- inflata* Neugeboren 1851—(Schwager 1865) in Paalzow 1932
- jurassica* Gümbel 1862—(Gümbel 1862) in Paalzow 1932
- Massilina jacksonensis* Cushman 1927—Cushman 1933
- Nodosaria antennula* (Costa) in Silvestri 1872—Cushman 1922
- contorta* Costa 1856—Franzenau 1892—Clodius 1922
- globifera* Reuss 1856—pre-occupied by *Nautilus (Orthoceras) globifer* Batsch 1791 (teste Cushman 1931)

- schwageri* Rzehak 1888—Paalzow 1932
spinosa Neugeboren 1852—Berry 1928
Quinqueloculina lobata Costa 1856—Silvestri 1927—
rotunda Roemer 1838—Carsey 1926
Reophax compressus Goës 1894—Herrmann 1917
variabilis Häusler 1885—Herrmann 1917
Robulus plicatus (d'Orbigny 1826)—Clodius 1922
Rotalia depressa v. Münster 1838—Ehrenberg 1841, 1854—Alth 1849—
 Terquem 1882—Protescu 1922
reticulata Reuss 1862—Cushman 1918 (non *Rotalina reticulata* Czjzek
 1847)
Sigmoilina schlumbergeri Silvestri 1904—Chapman 1907
Spirillina radiata Terquem 1886—Galloway and Ryniker 1930
Spiroloculina costata Terquem 1882—Hada 1931 (has been renamed *Sp.*
hadai nom. nov. Thalmann 1933)
elegans Silvestri 1896—Cushman 1921
terquemiana Fornasini 1900—Heron-Allen and Earland 1911
Textularia corrugata Costa 1856—Heron-Allen and Earland 1915 (teste
 Cushman 1932)
elegans (Hantken 1868, *Plecanium*)—Lacroix 1932 (This form has re-
 cently been renamed *T. tenuissima* Earland 1933)
Uvigerina pygmaea d'Orbigny 1826 var. *asperula* Silvestri 1900—Toula
 1914-15
Vaginulina eocaena Gümbel 1868—Liebus 1927
Valvulina inflata d'Orbigny 1839—Franke 1928
oblonga d'Orbigny 1839—Chapman 1918

A few words may also be said about the naming of new genera. If possible, any homophonetic words as *Ozawaina* Lee 1927—*Ozawaia* Cushman 1931, *Gümbelina* Egger 1899—*Gümbelia* Prever 1902, *Verbeekina* Staff 1909—*Verbeekia* Silvestri 1908, etc., should be avoided in order not to cause confusion even amongst generic names in Foraminifera.

Tjepoe, Java. October 1, 1933.

RECENT LITERATURE ON THE FORAMINIFERA

Below are given some of the more recent works on the foraminifera that have come to hand.

- Silvestri, A. Scientiarum Nuncius Radiophonicus—De fusulinidis.—Pont.
 Accad. Sci., Novi Lyncae, No. 22, May 25, 1933, pp. 4, 5. P.
 Chapman, F. Some Palaeozoic Fossils from Victoria.—Proc. Roy. Soc. Vic-
 toria, vol. 45, 1933, pp. 245-248, pl. XI. P.—Two new species from the
 Silurian, *Hemigordius lilydalensis* and *Trochammina bursaria*.

- Correlation of Carboniferous and Permian Rocks of Australia and New Zealand. I. Note on Our Present Knowledge of the Permian Foraminifera of Western Australia.—Rep't Australian and New Zealand Assoc. Adv. Sci., vol. XXI, 1933, pp. 453, 454. P.
- Schuh, Fr. Die geologischen Ergebnisse von fünf Tiefbohrungen aus den Jahren 1928/29, sowie neue Mitteilungen von drei älteren Tiefbohrungen in Mecklenburg.—Mitth. Mecklenburgischen Geol. Landes., ser. 6, vol. 41, 1933, pp. 43-104, 3 figs., 1 table.—Lists only.
- Howe, Henry V. Review of Tertiary Stratigraphy of Louisiana.—Bull. Amer. Petr. Geol., vol. 17, No. 6, June, 1933, pp. 613-655. T.—Records several index foraminifera.
- Howe, Henry V. and Cycil K. Moresi. Geology of Lafayette and St. Martin Parishes.—Louisiana Geol. Bull. No. 3, July 1, 1933, pp. i-xii, 1-237, maps and text figs. T.—Lists of foraminifera are given.
- Plummer, F. B. The Geology of Texas. Vol. 1, Pt. 3. Cenozoic Systems in Texas.—Univ. Texas Bull. 3232, July, 1933, pp. 519-818, pls. VII-X, text figs. 28-54. T.—Many lists of foraminifera and 1 plate.
- Thalmann, Hans E. Bibliography of the Foraminifera for the Year 1931.—Journ. Pal., vol. 7, No. 3, Sept., 1933, pp. 343-349.
Index to Genera and Species of Foraminifera Erected During the Year 1931.—l. c., pp. 350-355.
- Cushman, J. A. New Arctic Foraminifera Collected by Capt. R. A. Bartlett from Fox Basin and off the Northeast Coast of Greenland.—Smithsonian Misc. Coll., vol. 89, No. 9, Sept. 30, 1933, pp. 1-8, pls. 1, 2. R.—10 new species and varieties.
- Arni, P. Siderolites heracleae im Maestrictien des thessalischen Pindos.—Eclog. geol. Helv., vol. 27, No. 1, 1933, pp. 105-109, pl. V. C.
Foraminiferen des Senons und Untereocäns im Prätigauflisch.—Beiträge Geol. Karte der Schweiz, n. ser., pt. 65, 1933, pp. i-viii, 1-18, pls. 1-5. C. T.—1 new variety.
- Ellisor, A. C. Jackson Group of Formations in Texas with Notes on Frio and Vicksburg.—Bull. Amer. Assoc. Petr. Geol., vol. 17, No. 11, Nov., 1933, pp. 1293-1350, 7 pls., 8 text figs. T.—7 plates of foraminifera.
- Jedlitschka, Heinrich. Ein Profil durch die jüngeren Ueberlagerungen des Karbons in Orlau und seine Fauna.—Verhandl. Nat. Ver. Brünn, 65 J. 1934 (1933), pp. 1-16, 4 text figs. T.
Ueber Candorbulina, eine neue Foraminiferen-Gattung, und zwei neue Candaina-Arten.—l. c., pp. 17-26, text figs. 1-19. T.—A new genus *Candorbulina* with 3 new species.

J. A. C.

